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In Reply Please Quote Our Reference

Your Ref : 3084 SG1A / QM15C /

Our Ref : 200002047-9 /

Date : 12/05/03

Writer's Direct Line : 6330 2748

Elia Cheong Miranda & Sprouson
Robinson Rd 8.0-Box 1531
SC903031

RECEIVED
14 MAY 2003

BY:

Dear Sirs,

Invitation To Respond To A Written Opinion	
Application No:	200002047-9 /
Applicant:	Corning Incorporated /
Request Filed On:	08/08/02 /

Attached is a copy of written opinion drawn up by the Examiner in connection with the request made for:

- ☒ Search and Examination Report; or
☐ Examination Report

You are invited to respond to this opinion by submitting:

- (a) written arguments disagreeing with the Examiner's opinion, and/or
(b) an amendment of the specification of the application.

If you intend to respond, the response must be filed within 5 months from the date of this letter. You are also advised to let us know early by completing Part II of this letter if you intend not to respond.

The examiner will proceed to establish the examination report at the expiration of the allowed period when no response is received.

Annie Besant d/o Surendran (Madam)
for Registrar of Patents
Singapore

Part II

We refer to the above invitation. We do not wish to respond to this written opinion and please inform the IP,
Australia / Austrian Patent Office ** accordingly.

Date
** delete as appropriate

Name of Agent

AUSTRALIAN PATENT OFFICE

SEARCH REPORT

Applicant's or agent's file reference 3084SG14/GM/JC /		
Application No. SG 200002047-9 /	Application Filing Date (day/month/year) 11 April 2000 /	(Earliest) Priority Date (day/month/year) 11 April 2000 /
Applicant CORNING INCORPORATED		

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GROUP 1700

This search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I)
2. ☐ Unity of invention is lacking (See Box II)
3. ☐ The application contains disclosure of a nucleotide and/or amino acid sequence listing and the search was carried out on the basis of the sequence listing
 - ☐ filed with the application
 - ☐ furnished by the applicant separately from the application,
 - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in application as filed
4. With regard to the title, ☒ the text is approved as submitted by the applicant.
 - ☐ the text has been established by this Office to read as follows:
5. With regard to the abstract, ☒ the text is approved as submitted by the applicant
 - ☐ the text has been established by this Office as it appears in Box III
6. The figure of the drawings to be published with the abstract is Figure No.
 - ☐ as suggested by the applicant.
 - ☐ because the applicant failed to suggest a figure
 - ☐ because this figure better characterises the invention
 - ☒ None of the figures

AUSTRALIAN PATENT OFFICE

SEARCH REPORT

Application No.

SG 200002047-9

A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC)

Int. Cl.⁷ C03C 3/091

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl.⁷ C03C 3/091 (C03C 3/08 in Int. Cl.⁴ and earlier)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Citations of foreign equivalents US 6319867 and WO 2000/32528

Electronic data base consulted during the search (name of data base and, where practicable, search terms used)

Derwent Online Abstracts: C03C 3/08 and 3/091, keywords for Al₂O₃, B₂O₃, CaO, viscosity and density/specific gravity as appropriate. USPTO full text site, keywords glass and viscosity and density and silica and alumina and (boron or boria) and "strain point". All period 1975-2000.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 714862 A (ASAHI GLASS CO. LTD.) 5 June 1996. See examples 12, 31, 32.	1-29
X	JP 11-310430 A (ASAHI GLASS CO. LTD.) 9 November 1999. See example 12.	1-29
A	WO 98/27019 A (CORNING INCORPORATED) 25 June 1998. See examples.	1-29
A	US 5116788 A (DUMBAUGH, JR.) 26 May 1992. See examples.	1-29
A	US 4824808 A (DUMBAUGH, JR.) 25 April 1989. See examples.	1-29
A	US 4394453 A (DUMBAUGH, JR.) 19 July 1983. See examples.	1-29

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of submission of the request to the Australian Patent Office

24 March 2003

Date of completion of the search report

28 March 2003

Date of mailing of the search report

04 APR 2003

Name and mailing address

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
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Facsimile No. 61 2 62853929

Authorised officer

GRAEME J. BROXAM

Patent Document Cited in Search Report			Patent Family Member		
EP	714862	JP 09-169538	JP 09-169539	US	5801109
		US 6169047	JP 10-072237		
JP	11-310430	NONE			
WO	9827019	EP 960075	KR 2000057622	US	6060168
US	5116788	EP 528149	JP 05-213627		
US	4824808	AU 24743/88	CA 1320509	EP	316089
		HK 259/94	JP 01-160844	SG	149/94
US	4394453	NONE			
END OF ANNEX					

AUSTRALIAN PATENT OFFICE

WRITTEN OPINION

		Date of mailing <i>day/month/year</i>		04 APR 2003
Applicant's or agent's file reference 3084G14/GM/JC		REPLY DUE within FIVE MONTHS of the date of the Registrar's letter enclosing the written opinion		
Application No. SG 200002047-9	Application Filing Date (<i>day/month/year</i>) 11 April 2000	Priority Date (<i>day/month/year</i>) 11 April 2000		
International Patent Classification (IPC) (as indicated in the search report) Int. Cl. ⁷ C03C 3/091				
Applicant CORNING INCORPORATED				

1. This First written opinion consists of a total of 4 sheets.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - III ☐ Lack of unity of invention
 - IV ☒ Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - V ☐ Certain documents cited
 - VI ☐ Certain defects in the application
 - VII ☒ Certain observations on the application
3. This opinion is based upon the assumption that the priority claim is valid.
4. The search report used was issued by the Australian Patent Office, and the date of completion is: 28 March 2003 ✓
5. If no reply is filed, the examination report will be established on the basis of this opinion.
6. The date by which the examination report will be established is: 11 July 2004 ✓

Name and mailing address
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Authorized Officer

GRAEME J. BROXAM

WRITTEN OPINION

SG 200002047-9

I. Basis of the opinion

1. This opinion has been drawn on the basis of:

☒ the application as originally filed.

☐ the description, pages , as originally filed,
pages , filed with the request,
pages , received on with the letter of

☐ the claims, pages , as originally filed,
 pages , filed with the request,
 pages , received on with the letter of

☐ the drawings, sheets/fig. , as originally filed,
 sheets/fig. , filed with the request,
 sheets/fig. , received on with the letters of

☐ the sequence listing part of the description:

pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. The amendments have resulted in the cancellation of: pages:

sheets of drawings/figures No :

- 3 ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box.

4. Additional observations, if necessary:

IV. Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	YES
	Claims 1-29	NO
Inventive step (IS)	Claims	YES
	Claims 1-29	NO
Industrial applicability (IA)	Claims 1-29	YES
	Claims	NO

2. Citations and explanations

The following documents were cited in the search report established by this office:

- a) EP 714862 A (ASAHI GLASS CO. LTD.) 5 June 1996. See examples 12, 31, 32.
- b) JP 11-310430 A (ASAHI GLASS CO. LTD.) 9 November 1999. See example 12.
- c) WO 98/27019 A (CORNING INCORPORATED) 25 June 1998. See examples.
- d) US 5116788 A (DUMBAUGH, JR.) 26 May 1992. See examples.
- e) US 4824808 A (DUMBAUGH, JR.) 25 April 1989. See examples.
- f) US 4394453 A (DUMBAUGH, JR.) 19 July 1983. See examples.

NOTE: The Singapore application is equivalent to foreign applications WO 00/32528 A published 8 June 2000 and US Patent 6319867 B1 of 20 November 2001, the search results of which were also considered during the search. The US equivalent of document (c) and document (f) were cited in the granted US Patent.

Documents (c) to (f) are cited as underpinning the current state of the art in making flat screen display glasses. They describe the desirable characteristics of such glasses in terms of their viscosity at solidus, temperatures of strain and melting, density and/or coefficient of expansion for such usages, in most cases these parameters being comparable to those of the instant application. However, none have essentially similar compositions, documents (c) and (f) being the closest with essentially no Ba, but less silica and more alumina, while documents (d) and (e) require the presence of Ba. In my opinion there is no reason to believe that it would have been obvious to a person skilled in the art to use Ba-free Si/Al/B/Ca glass compositions in the defined ranges with an expectation of obtaining the same results, so the claims of the Singapore application are considered to be novel and possess an inventive step in the light of these documents.

Documents (a) and (b), however, both disclose, in the examples indicated above, glass compositions with essential components in the nominated ranges, intended for the same basic use, as in the Singapore application. They have consistent densities and coefficients of thermal expansion as in the current invention, but do not define the viscosity at liquidus itself, although they have a viscosity an order of magnitude less at higher temperatures. Given all the similarities in the defined parameters, it must be assumed that they either have comparable liquidus viscosities, or else the claims do not fully define the invention as they do not indicate how a different *desiderata* is obtained. Clarification is required.

Given that the broadest claims must contain all of the essential features of the invention, it follows that the additional features in the dependent claim must be optional features that, even if not specifically disclosed in the citations, would appear to be intrinsic features of the composition, or mere optimisation of known parameters to obtain a better, but non-surprising, result, and do not in themselves add novelty over the cited art.

Notwithstanding the above matters, the claims of the Singapore application are clearly Industrially Applicable.

VII. Certain observations on the application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 1 does not fully define the invention because it does not include other apparently essential and characterising features of the invention, such as the linear coefficient of expansion, chemical stability, strain point and melting temperature, that appear to be essential so that the objectives of the invention will be met. Conversely, it would appear probable that compositions in accordance with claim 1 as it currently stands could be prepared that did not obtain the other required characteristics. This is particularly significant in the light of the discussion of the citations where it is not clear how an apparently different physical parameter is obtained when all the other essential features are the same.

Claims 13 and 14 are not clear because they are directed to a device whereas claim 12 to which they are appended is directed to an improvement in the device.

- ☒ The claimed invention is patentable according to Section 13(2); or
- ☐ The claimed invention is unpatentable according to Section 13(2) because:

WHAT IS CLAIMED IS:

1. An aluminosilicate glass exhibiting a density less than about 2.45 g/cm^3 and a liquidus viscosity greater than about 200,000 poises, the glass consisting essentially of the following composition as calculated in mol percent on an oxide basis: 65-75 SiO_2 , 7-13 Al_2O_3 , 5-15 B_2O_3 , 0-3 MgO , 5-15 CaO , 0-5 SrO , and essentially free of BaO .
2. The glass of claim 1, wherein the $\text{RO}/\text{Al}_2\text{O}_3$ ratio is between 0.9 and 1.2, wherein R represents Mg, Ca, Sr and Ba.
3. The glass of claim 1, wherein the glass has a strain point greater than about 650°C .
4. The glass of claim 1, wherein the glass has a linear coefficient of thermal expansion (CTE) over the temperature range $0\text{-}300^\circ\text{C}$ between $28\text{-}35 \times 10^{-7}/^\circ\text{C}$.
5. The glass of claim 4, wherein the glass has a strain point greater than about 660°C .
6. The glass of claim 4, wherein the glass has a melting temperature less than about 1700°C .
7. The glass of claim 4, wherein the glass has a CTE of $28\text{-}33 \times 10^{-7}/^\circ\text{C}$.
8. The glass of claim 1, wherein the glass exhibits a weight loss of less than 0.5 mg/cm^2 after immersion in a solution of 1 part 50 wt.% HF and 10 parts 40 wt. % NH_4F for 5 minutes at 30°C .
9. The glass of claim 1, wherein the glass has a liquidus viscosity greater than about 400,000 poises.
10. A glass according to claim 1, wherein the glass has a liquidus viscosity greater than about 600,000 poises.
11. A glass according to claim 1, wherein the glass contains between 0-1 mole percent MgO when the glass contains no SrO .
12. In a flat panel display device, the improvement comprising a substrate in accordance with claim 1.
13. The flat panel display device of claim 12, wherein the substrate has an average surface roughness less than about 0.5 nm.

14. The flat panel display device of claim 12, wherein the substrate has an average internal stress less than about 150 psi.

15. A glass according to claim 1, wherein the glass has a composition consisting essentially of, as expressed in mol percent on an oxide basis: 67-73 SiO₂, 8-11.5 Al₂O₃, 8-12 B₂O₃, 0-1 MgO, 5.5-11 CaO, and 0-5 SrO.

16. The glass of claim 15, wherein the glass has a strain point greater than about 650 °C.

17. The glass of claim 15, wherein the glass has a CTE of $28-33 \times 10^{-7}/^{\circ}\text{C}$.

18. The glass of claim 17, wherein the glass has a strain point greater than about 660°C.

19. The glass of claim 17, wherein the glass has a melting temperature less than about 1700 °C.

20. The glass of claim 17, wherein the glass has a liquidus viscosity greater than 400,000 poises.

21. The glass of claim 17, wherein the glass has a liquidus viscosity greater than about 800,000 poises

22. In a flat panel display device, the improvement comprising a substrate in accordance with claim 17.

23. The flat panel display device of claim 22, wherein the substrate has an average surface roughness less than about 0.5 nm.

24. The flat panel display device of claim 22, wherein the substrate has an average internal stress less than about 150 psi.

25. In a flat panel display device, the improvement comprising a substrate in accordance with claim 21.

26. A substrate for a flat panel display device, wherein the substrate is comprised of a flat, transparent glass exhibiting a density less than about 2.40 g/cm³, a linear coefficient of thermal expansion (CTE) over the temperature range 0-300°C between $28-33 \times 10^{-7}/^{\circ}\text{C}$ and having a liquidus viscosity greater than about 400,000 poises, the glass consisting essentially of the following composition as calculated in mol percent on an oxide basis: 65-75 SiO₂, 7-13 Al₂O₃, 5-15 B₂O₃, 0-3 MgO, 5-15 CaO,

0-5 SrO, and essentially free of BaO and the RO/Al_2O_3 ratio is 0.92-0.96, wherein R represents Mg, Ca, Sr, and Ba.

27. A substrate according to claim 26, wherein the glass exhibits a strain point exceeding 660 °C.

28. The substrate according to claim 26, wherein the substrate has an average surface roughness less than about 0.5 nm.

29. The substrate according to claim 26, wherein the substrate has an average internal stress less than about 150 psi.